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ABSTRACT

This paper reports an investigation that was done ex post facto, examining the hypothesis that within economics courses defined economics students achieved better results than did law students in the same courses. This should not be the case if the courses are truly multifunctional. Information on an economics and money course and a course on the balance sheet, profit and loss account, and administrative procedures from 1985 to 1988 for 389 college economics students and 1,893 law students confirmed that economics students had a better chance of passing these courses and that they made fewer attempts at the examinations than did the law students. The overall failure of 49.9% among economics students for the economics and money course contrasts with the 70.3% failure rate of law students. Similar results for the other course also demonstrate that economics students took fewer attempts to pass the examinations. A possible explanation lies in the entrance level of prior knowledge for the students and the effects of the interest value of the material. Seven figures and 12 tables present analysis results. (Contains eight references.) (SLD)

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Studies on the multi-functional nature of courses in economics and the role of domain specific expertise

Ex post facto research 1

F.J.R.C. Dochy

M.R.J. Bouwens

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Studies on the multi-functional nature of a number of courses in economics and the role of domain specific expertise.

Ex post facto research 1

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Summary.

This paper reports an investigation which was done ex post facto. The hypothesis was that within economics courses the defined ecomomics students achieved better results than law students for the same courses. This is not supposed to be the fact if courses are truly multi-functional.
Analysis of the information from 1985 to 1988 confirmed that economics students have a better chance of passing these courses and make fewer attempts at exams than law students.
For possible explanations for this phenomenon, one can think about the entrance level of prior knowledge of different students and the interestingness effect.

Introduction.

Within the Educational Technology Innovation Centre, the Prior Knowledge States (PKS) project has been investigating the role of the students' prior knowledge states in the learning process, mainly in economics studies (Dochy,1989).

The fact that students of economics achieve better results in the courses on "Economics and Money" (E & M) and "the Balance sheet, Profit and Loss Account and Administrative Procedures" (BRAP) than law students is largely seen as the product of common knowledge.

This problem is regarded as typical of the multi-functional problem in courses. The multi-functional dimension means that students from different faculties or disciplines can make functional use of a course without encountering special problems (such as, delay in completing the course, dropping out, major subject-specific problems, etc.). The multi-functional dimension is largely to be seen as the product of prior knowledge. Law students are claimed to have a less expertise or prior knowledge than economics students, and this gives direct rise to specific problems and poorer examination results. The knowledge state among law students is also claimed to be, by definition, inadequate, or the courses are claimed not to be truly multi-functional.
This ex post facto research paper is intended to give foundation to these rumours, i.e. either verify them or falsify them. Ex post facto research is used here in a broad sense: "The researcher arrives after the fact that the treatments have been imposed on the subjects" (Shavelson, 1981). In this case it means that we investigated the phenomenon after the students have completed the course and taken the examinations. The objective of this research is therefore to see whether economic and law students complete the E & M and BRAP courses with a clear difference in respect of efficiency. Further research will investigate the reasons for this and determine whether the causes reveal how the situation can be remedied.
The indications which we use in this first ex post facto piece of research are the number of passes and fails and the number of examination attempts. In a second research project, we shall investigate the exam results in greater depth in order, where possible, to analyze the courses.

1. The course on Economics and Money.

This course has been available since March 1985. Up to May 1988, the date on which this analysis was carried out, 5,654 students had registered for this course, 2,541 of whom completed it. After this analysis and through January 1989, this means a total of 6,352 registered students and 3,999 who completed the course.
Of the total population, of 5,654 and 6,352 respectively, there were 3,713 and 4,242 students respectively who took, or had taken two, three, four or more courses.
The global background characteristics of this population is fairly constant: approximately 79% men and 21% women; 41% below 30 years of age, 40% between 31 and 40, 19% older; approximately 24% had a lower secondary school, 31% had a HAVO/VWO (high school), 35% had HBO (tertiary education), 10% WO (university education).
About 25% of the students who completed the course were successful in passing their examination within six months and another 41% passed between the seventh and the twelfth month.

The research population used here were students taking diplomas in law or economics who had passed at least two courses. These were a total of 2,282 students, or 1,893 law students and 389 students of economics.

1.1. Students of Economics taking the Economics and Money course.

The table below (table 1) gives the percentage of economics students (n=389) who took the Economics and Money course (E&G) examination 0, 1, 2 or 3 times.
Economics students are defined as students who are taking a diploma in Economics and who have passed two courses within this program. These percentages are linked in terms of the period in which the students started the course. In principle the Open University offers three examinationdates ,per course, a year. Since the course on Economics and Money has been available since March 1985 the first fixed examinationdate was june 1985 (8506). Nine periods can be distinguished; viz.

period 1: through 8506.
period 2: 8507 through 8510
period 3: 8511 through 8602
period 4: 8603 through 8606
period 5: 8607 through 8610
period 6: 8611 through 8702
period 7: 8703 through 8706
period 8: 8707 through 8710
period 9: 8711 through 8804

	Number			
Period	0	1	2	3
1	37.1	39.0	15.2	8.6
2	36.4	63.6		
3	47.8	43.5	8.7	
4	20.0	67.1	11.8	1.2
5	25.0	62.5	12.5	
6	39.1	52.2	4.3	4.3
7	26.1	60.9	13.0	
8	27.3	72.7		
9	96.3	3.7		

Table 1: The number of times E&M exams were taken by economics students in percentage per period.

	Number			
	0	1	2	3
Total	35.2%	52.2%	9.8%	2.8%

Table 2: The number of times E&M exams were taken by economics students (1985-88).

Differences among periods are to be seen as acceptable, given the fact that the first period could be lower in first trial succes rate (39.0%) because of the starting problems form both university and first students and given the fact that later research (ex post facto 2) shows that the exam in period 3 (first trial succes rate 43.5%) was unreliable (alfa = 0.1).
The largest percentage of economics students 52.2% (n=203) took the examination once.
Zero, two or three attempts occur with the following frequencies 35.2% (n=1370, 9.8% (n=38) and 2.8% (n=11).

If we then look at the percentage of pass and fail for the same population on the E & M course, they do not make much difference. 49.9% (n=194) fails as against 50.1% (n=195) passes. Table 3 and 4 give an overview of these percentages involved.

Period	percentage fails	percentage passes
1	56.2	43.8
2	54.5	45.5
3	52.2	47.8
4	35.3	64.7
5	41.7	58.3
6	39.1	60.9
7	47.8	52.2
8	42.4	57.6
9	100.0	

Table 3: pass and fail percentage of economics students for the E & M course per period

	Fails	Passes
Total	49.9%	50.1%

Table 4: pass and fail percentage of economics students for the E&M course (1985-88)

1.2 Law students compared with economics students

If we compare the percentage of fails for economics students with the percentage of fails for law students on the E & M course, then the percentage of fails among law students would seem to differ radically from the failure rate among the economics students.
Law students are defined as students taking a diploma in Law who have completed at least 2 courses within this program.

Table 5 shows a somehow consistent picture over periods, exept a lower succes rate in period three (possibly due to the unreliability of the exam found in one of our later investigations) and a higher succes rate in period seven.

Compare 49.9% (n=194) fails among economics students (table 4) with 70.3% (n=1331) fails among law students (table 6).
Confer here too, 50.1% (n=195) passes among economics students (table 4) with 29.7% (n=562) passes among law students (table 6). If the separate periods are compared for both of the students, there are few striking differences.

Period	percentage failed	percentage passed
1	65.1	34.9
2	72.6	27.4
3	76.4	23.6
4	69.5	30.5
5	60.4	39.6
6	65.1	34.9
7	57.8	42.2
8	73.5	26.5
9	96.7	3.3

Table 5: percentage passes and fails among law students on the E & M course per period

	Fails	Passes
Total	70.3%	29.7%

Table 6: percentage passes and fails among law students on the E&M course (1985-88)

1.3 Total population who toke the E & M exam

From a population of 2,282, there were 1255 students who toke the exam. If we compare the total population of the students (economics and law, n = 1255) who have taken the E & M exam with one another, in respect of their passing or not, the economics students turn out to have passed in 77.4% (n=195) of the cases as against 56.1% (n=563) of the law students (see table 7).
The total population comprises 79.9% (n=1003) law students and 20.1% (n=252) economics students.

	law students	economics students
% fails	43.9	22.6
% passes	56.1	77.4

Table 7: Diploma students who have taken the E & M course exam

If we explore this data further for both groups separately and the number of times that the E & M course was taken, then we see that the economics students (n=252) had a maximum of three attempts (table 8), whereas the law students (n=1003) had up to five attempts at the exam (table 9). This means that for the economics students 79.3% (n=161) passed at the first attempt, whereas for the law students 52.8% (n=316) of the candidates passed the exam at the first attempt. For further specification of the data concerning the number of times the exam was taken see table 8 and table 9.

	1 attempt	2 attempts	3 attempts
% fails	20.7	36.8	9.1
% passes	79.3	63.2	90.9

Table 8: Number of attempts at the E & M exam by the economics students

	1 attempt	2 attempts	3 attempts	4 attempts	5 attempts
% fails	47.2	38.4	36.0	52.6	75.0
% passes	52.8	61.6	64.0	47.4	25.0

Table 9: Number of attempts at E & M course by law students

2. The Balance sheet, Profit and Loss account and Administrative Procedures Course (BRAP)

This course was available from September 1985. Up to May 1988 4,330 students were enrolled for the BRAP course, 1,383 of whom completed it. Up to January 1989 there were 5,086 students registered for the course and 2,361 students who completed it.
Of the number of registered students 4,330 and 5,086 respectively, there were 2,828 and 3,378 who took two, three, four or more courses.

In this course too, we see a fairly constant general characteristics in the population, which is virtually the same as the student population for the E & M course.
80% men and 20% women; approximately 41% under 30, 41% between 31 and 40 years of a[illegible] 18% were older; approximately 22% had lower secondary schooling, [illegible]9% had HAVO/VWO schooling, 35% had HBO and 14% had university (WO) education.
Approximately 39% of the students who completed the course passed the exam within six months and another 38% passed between the sixth and the twelfth month.
The research population used comprised registered diploma students, at the time of this analysis (the end of May 1988) 1,512 (1,200 law students and 312 economics students).
We are comparing the prior education of two groups of diploma students (law and economics n =1,512) who registered for the Balance Sheet, Profit and Loss account and Administrative Procedures course (BRAP).
The differences in education between the two groups are very slight. It is clear that the largest group of students have completed either HAVO/VWO or HBO.

We look at the number of times the exam was taken for this course (BRAP) during various periods in which it was held. The following periods can be distinguished

period 2: 8507 through 8510
period 3: 8511 through 8602
period 4: 8603 through 8606
period 5: 8607 through 8610
period 6: 8611 through 8702
period 7: 8703 through 8706
period 8: 8707 through 8710
period 9: 8711 through 8804

If we compare the relative percentages for the number of times exams were taken by the law students (n=1200) and economics students (n=312), then we can already see a difference after one attempt. In the case of economics students 42.9% (n=134) took the exam once as against only 29.7% (n=357) of the law students (the percentage of students who did not take or have not yet taken the exam was 46.8% (n=146) for the economics students and 53.8% (n=646) for the law students). This implies that the percentage of those who took the exam 2, 3 or 5 times is greater for the law students than for the economics students. An exeption to this was formed by those who took the tests 4 times, in both cases it was 0.6% of the total student population. Here too there were virtually no differences as far as the distinction in periods was concerned when comparing the economics students with the law students. Tables 10, 11, 12 and 13 give further specifications.

period	0	1	2	3	4 attempts
2	42.9	37.1	17.1	2.9	
3	29.4	47.1	17.6		5.9
4	40.0	47.5	10.0	1.3	1.3
5	20.0	65.7	14.3		
6	27.0	62.2	5.4	5.4	
7	53.3	43.3	3.3		
8	46.9	50.0	3.1		
9	100.0				

Table 10: Number of attempts at BRAP course exam by economics students in percentage during 8 different periods

	0	1	2	3	4 attempts
column total	46.8%	42.9%	8.4%	1.3%	.6%

Table 11: Total number of attempts at BRAP course exam by economics students in percentage (8507 through 8804)

Period	0	1	2	3	4	5 attempts
2	43.2	29.6	21.4	4.4	1.0	.5
3	43.3	33.6	16.4	6.3	.4	
4	52.4	32.1	10.7	3.6	1.2	
5	48.8	31.7	12.2	7.3		
6	42.1	37.9	16.8	3.2		
7	54.8	36.9	8.3			
8	62.9	37.1				
9	98.5	1.5				

Table 12: Number of attempts at BRAP course exam by law students in percentage for 8 different periods

	0	1	2	3	4	5 attempts
column total	53.8%	29.7%	12.2%	3.6%	.6%	.1%

Table 13: Total number of attempts at BRAP course exam by law students in percentage (8507 through 8804)

3. Earlier analyses of study results on Economics and Money.

On the basis of the comparison with analyses carried out earlier it can be stated that the results found were confirmed there too (Van Meurs, 1986; Joosten, 1987).
Of those students who registered for several courses the students who registered for courses in law, had the lowest study yield.
Compared with the other subjects, the percentage of the examination candidates among the law students was lowest and of the examination candidates, the percentage who failed was highest among law students (Joosten,1987).
Tables 9, 10, 11 and 12 give more details. They are based on earlier analyses of the fact that students follow at least one course per discipline/area in addition to the E & M course.

N	EaMa	BM	CS	E	NS	L	SS	T	Total
registered	954	1210	119	1965	56	2455	135	427	4568
examination-candidates	62	594	54	1026	31	969	66	212	1442
passed	17	433	38	687	20	528	48	158	825

Table 9: The number of students registered for Economics and Money, who participated in the examination and the number of passes per discipline

(EaMa= Economics and Money alone, BM= Business Management, CS= Cultural Science, E= Economics, NS= Natural Sciences, L= Law, SS= Social Sciences T= Technology)

Start	EM	BM	CS	E	NS	L	SS	T	Tot	N-r
8503-8507	10,1%	74,1%	59,0%	67,6%	68,8%	53,7%	69,0%	81,0%	46,1%	1504
8508-8512	12,8%	52,2%	59,1%	56,8%	80,0%	39,2%	50,0%	72,0%	38,0%	787
8601-8602	-	38,9%	66,7%	49,4%	100%	33,1%	37,5%	60%	32,4%	185
8603-8606	5,3%	42,6%	31,3%	42,0%	52,9%	32,1%	25,9%	40,5%	24,5%	1115
8607-8610	8,1%	36,1%	50,0%	45,1%	80%	25,6%	25%	40,8%	23,8%	433
8611-8701	1,3%	7,9%	16,7%	6,2%	33,3%	7,3%	0%	15,4%	4,8%	270
8702-8705	-	-	-	-	-	-	-	-	-	274
Total	6,5%	49,1%	45,5%	52,2%	55,4%	39,5%	48,9%	49,6%	31,6%	4568
N-registered	954	1210	119	1965	56	2455	135	427	4568	

Table 10: Percentage of examination candidates among the registered students per period registered for Economics and Money, by discipline

(EM= Economics and Money, BM= Business Management, CS= Cultural Science, E= Economics, NS= Natural Sciences, L= Law, SS= Social Sciences, T= Technology, Tot= Total, N-r= N-registered)

Start	EM	BM	CS	E	NS	L	SS	T	Tot	N-r
8503-8507	25%	72%	73,9%	64,7%	54,5%	56,3%	72,5%	71,3%	56,1%	694
8508-8512	20%	72,6%	61,5%	67,8%	75%	51,5%	78,6%	75%	54,5%	299
8601-8602	-	71,4%	100%	65,9%	100%	41,5%	100%	77,8%	53,3%	60
8603-8606	28,6%	75,6%	80%	72,9%	77,8%	57,4%	42,9%	79,6%	63,7%	273
8607-8610	36,4%	74,4%	60%	70,8%	50%	56,1%	100%	80%	61,2%	103
8611-8701	0%	60%	0%	20%	0%	37,5%	-	50%	30,8%	13
8702-8705	-	-	-	-	-	-	-	-	-	-
Total	27,4%	72,9%	70,4%	67,0%	64,5%	54,5%	72,7%	74,5%	57,2%	1442
N-registered	62	594	54	1026	31	969	66	212	1442	

Table 11: Pass rate per discipline for the period registered for

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It must be noted that the pass rate among examination candidates is higher for students in Business Management, Cultural Science, Social Sciences and Technology, than students in Economics.

Start	EM	BM	CS	E	NS	L	SS	T	Tot	N-r
8503-8507	2,5%	53,3%	43,6%	43,7%	37,5%	30,2%	50%	57,8%	25,9%	389
8508-8512	2,6%	37,9%	36,4%	38,5%	60%	20,2%	39,3%	54%	20,7%	163
8601-8602	-	27,8%	66,7%	32,5%	100%	13,7%	37,5%	46,7%	17,3	32
8603-8606	1,5%	32,2%	25%	30,6%	41,2%	18,4%	11,1%	32,2%	15,6%	174
8607-8610	2,9%	26,9%	30%	31,9%	40%	14,4%	25%	32,7%	14,5%	63
8611-8701	0%	4,8%	0%	1,2%	0%	2,7%	0%	7,7%	1,5%	4
8702-8705	-	-	-	-	-	-	-	-	-	-
Total	1,8%	35,8%	31,9%	35%	35,7%	21,5%	35,6%	37%	18,1%	825
N-registered	954	1210	119	1965	56	2455	135	427	4568	

Table 12: Pass rate per discipline among registered students for the period registered for Economics and Money

(EM= Economics and Money, BM= Business Management, CS= Cultural Science, E= Economics, NS= Natural Sciences, L= Law, SS= Social Sciences, T= Technology, Tot= Total, N-r= N-registered)

Hitherto we have been concerned with the examination candidates.
We see from tables 9 and 10 that a not inconsiderable number of the students drop out. The students who registered but did not take part in the exam are considered as drop-outs. Approximately a third of the registered students took part in the exam (31.6%). Although, this is 52.2 % for economics and 39.5% for law. The drop-out percentage is 47.8% and 60.5% respectively (see figure 1 ; compare with table 9). Compared with other distance teaching universities, this drop-out rate is common to this kind of teriary education (Powell, 1990; CDE, 1989).

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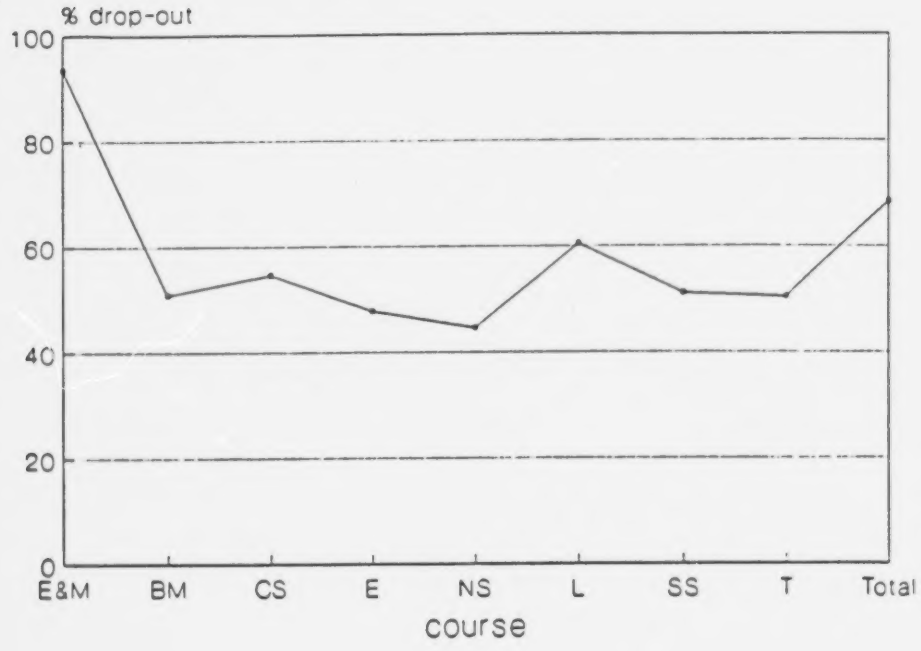

Figure 1: The drop-out rate within the Economics and Money course by discipline

The percentage of passes is (using the most recent definition of student, namely having followed at least one course in addition to the E & M course) 67.0% for economics students and 54.5% for law students. If we also take account of the drop-out rate, we see a pass rate of 35% for economics students and 21.5% for law students (tables 11 and 12).

Conclusion.

This analysis of four years of examinations shows some clear facts.
Economics students, who have not necessarily taken the exam for the E & M course, seem, in most cases, to make one attempt, in such case for this group the chance of passing for the total period (8506 through 8804) was around 50% (see figure 2). In most exam periods there are more passes than fails. It would appear logical that this is not so in the initial periods (preparation periods) and in the last period (in which no one took the exam).

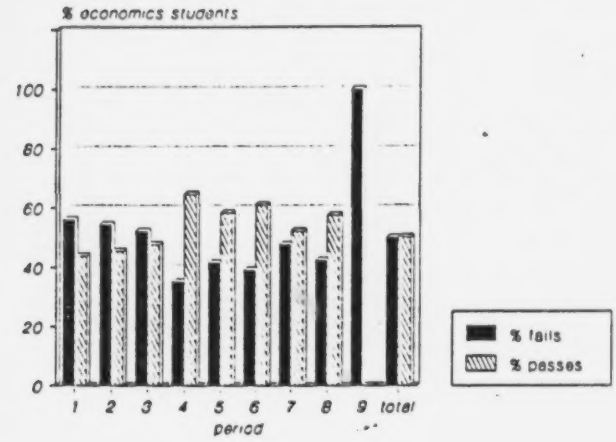

Figure 2: Pass and fail percentages economics students for the E&M course

Law students who have not necessarily taken an exam for the E & M course appear to have a pass percentage for the same period of only 29.7% (figure 3). We see here continually more fails than passes. The block totals in the histograms show the situation clearly.

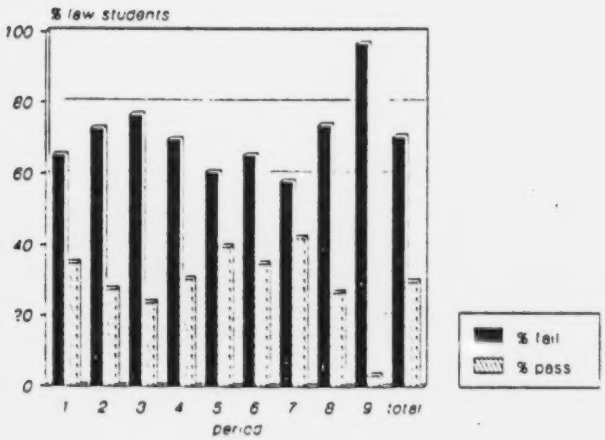

Figure 3: Pass and fail percentages law students for the E&M course

If we compare both groups of students after they have taken the exam then the economics students appear to need a maximum of three attempts in 77.4% of the cases as against 56.1% of the law students who need a maximum of five attempts to pass.

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In earlier studies 67.0 % and 54.5 % were found, and this is highly comparable. If we take account of the drop-out rate then it can be seen that 35 % of the economics students pass and 21.5 % of the law students.

If we compare the law and economics students who registered for the BRAP course with one another as far as prior education is concerned, there would appear to be clearly demonstrable differences.

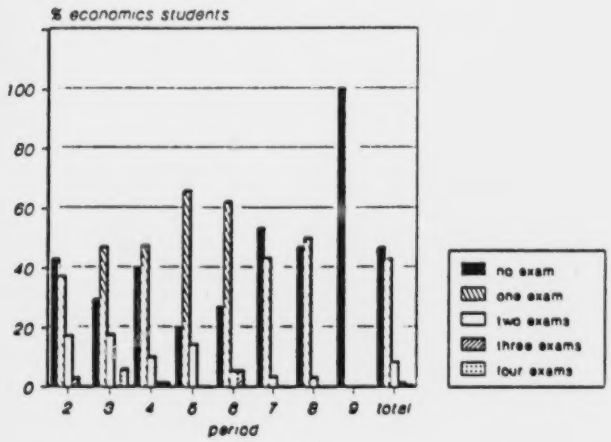

Figure 4
number of times an exam is taken for the BRAP course by economics students

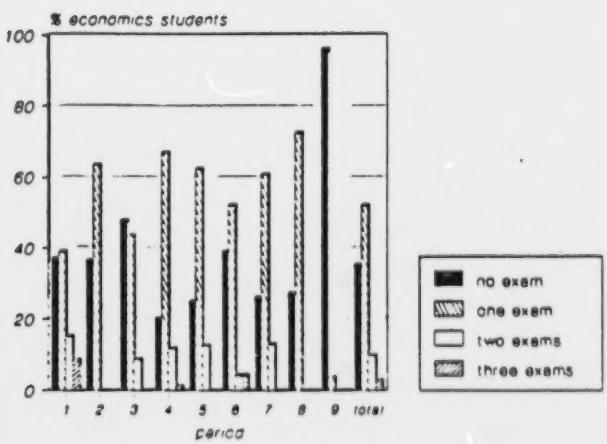

Figure 5: number of times an E & M exam is taken by economics students

On the one hand the student population for both economics courses differs little, on the other the exam behaviour and the number of exam attempts is also fairly similar. Compare figures six and seven.

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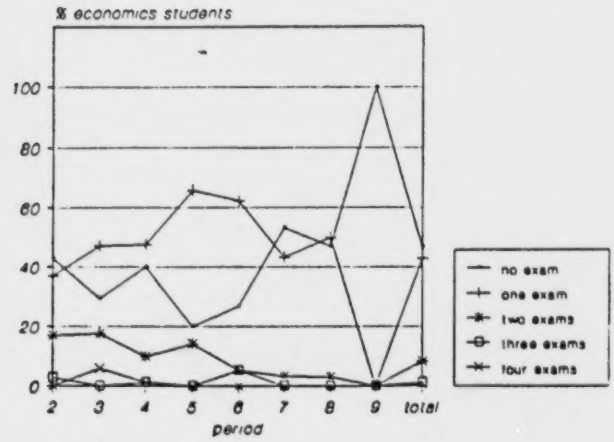

Figure 6:
the number of times a BRAP exam is taken by the economics students

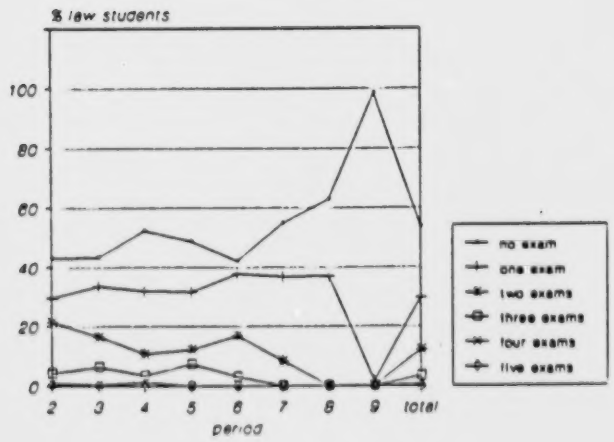

Figure 7:
the number of times a BRAP exam is taken by the law students

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If we compare both groups of students who have not necessarily taken the exam for the BRAP course, we see that the economics students make one attempt in 42.9% of the cases as against 29.7% of the law students. This implies that the law students make more attempts and have a lower rate of success. The diagrams in the figures six and seven show the different patterns.
The fact that the pass rate among examination candidates is higher in disciplines such as Business Management, Cultural Science, Social Sciences and Technology than it is in Economics is remarkable. One could think of the lack of domain-specific expertise among law students as an explanation for the conflicting results between law and economics students.

On the basis of available information on the exams from 1985 to 1988 the following conclusions can be advanced in respect of the E & M and BRAP courses.
Economics students have a better chance of passing these courses and make fewer attempts at exams than law students.
Further research will have to show the extent to which the cause of this lies in the lack of prior knowledge among law students or in too high entry requirements for the course (too great a requirement for prior knowledge). The degree to which this last plays a role and any solutions will determine the multi-functional value of the courses.

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